量子信息科技学术研讨会 (2018.9.17-21)

报告

单分子磁共振谱学

Electron Spin Resonance Spectroscopy of A Single Molecule

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讲者介绍 Biography

在中国科大获得理学学士、工学学士和物理学博士学位，博士导师杜江峰教授。研究方向为单自旋量子精密测量及在化学、生物等交叉领域的应用。以金刚石氮-空位等固态体系为量子信息载体，自主研制谱仪、发展量子计算和精密测量技术、并将其用于单分子科学的研究。实验成果相继发表在 Science(2 篇), Nature Physics (1 篇), Nature Communications (5 篇), Physical Review Letters (11 篇)等杂志上，引用 800 余次。先后获得亚太电子顺磁共振学会青年科学家奖，中国生物物理学会“贝时璋青年生物物理学家奖”，国际顺磁共振学会青年科学家奖。承担科技部重大专项青年项目，基金委优青、重大研究计划重点项目和面上项目，中组部万人计划青年拔尖人才等。

报告摘要 Abstract

Magnetic resonance (MR) is one of the most important techniques for characterizing compositions, structure and dynamics of molecules. However, current methods need billions of uniform units on centimeter-scale to accumulate large enough signal-to-noise ratio. High sensitivity MR techniques are urgently needed for new applications on nanoscale. A sensor to accomplish nanoscale targets detection is the recently developed atomic sized magnetic field sensor based on the nitrogen-vacancy (NV) defect center in diamond. By combining the quantum controls and long coherence time of NV, we have experimentally realized nanoscale nuclear MR and electron spin resonance. We and co-workers have successfully detected a single electron spin [1], obtained the first single-protein spin resonance spectroscopy under ambient conditions [2], achieved electron magnetic resonance spectroscopy of single molecules under physiological conditions [3]. These work will be potentially used as a new tool on a broad range of scientific areas from life science to physics and chemistry.

References:

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